

### **REMARKS/ARGUMENTS**

The Applicants have carefully considered this application in connection with the Examiner's Action and respectfully request reconsideration of this application in view of the following remarks.

The Applicants originally submitted Claims 1-10 in the application. Moreover, the Applicants previously withdrew Claims 7-10 and added Claim 12. Presently, the Applicants have not amended, cancelled nor added any claims. Accordingly, Claims 1-6 and 11-12 are currently pending in the application.

#### **I. Rejection of Claims 1, 4-6, 11 and 12 under 35 U.S.C. §102**

The Examiner has rejected Claims 1, 4-6, 11 and 12 under 35 U.S.C. §102(b) as being anticipated by Japanese Patent No. 1-259195 to Soeda, *et al.* ("Soeda"). Independent Claim 1 currently includes the element that the tensile stress state is internal to the tin or tin alloy film. Soeda fails to disclose this element.

Soeda is directed, at least according to the Examiner's translation (which the Applicant's can not comment on the accuracy of) to tin-coating material for copper or copper alloy. (Title) Soeda teaches that "for copper alloy material coated with tin, the tin surface is gradually oxidized with the elapse of time and the surface energy is decreased. Tin atoms move from inside the tin coating layer with a high internal stress to the surface. Furthermore, copper atoms also diffuse slowly to the tin coating layer to form  $\text{Cu}_6\text{Sn}_5$ ,  $\text{Cu}_3\text{Sn}$  or other intermetallic compounds. By these two actions, the increase in the internal stress of the tin coating layer and the movement of tin

atoms to the surface are promoted. The tin atoms are pushed out of defect sections or scratched portions of the tin coating layer or weak point portion of the oxide layer on the surface. Furthermore, with the continuous increase in internal stress with surface oxidation and the growth of intermetallic compounds, whiskers are grown." (See, Soeda at page 5, third full paragraph).

First, Soeda fails to disclose whether its tin alloy layer is in either a compressive or a tensile state. The most clear indication of whether the tin alloy layer is in a compressive state or tensile state may be found in Soeda, wherein it indicates that its sample was placed indoors, and that whiskers formed in the portion (area 20mm x 50 mm) shown by B in Figure 1 on the compressive stress side were observed with a microscope. (See, Soeda at page 6, first full paragraph). For this reason alone, Soeda cannot be an anticipating reference.

Second, Soeda speaks readily about the increase and/or pronouncement of whisker growth. Those skilled in the art understand that to increase or pronounce whisker growth, tin alloys in a compressive state must be used. For instance, it has clearly been demonstrated that compressive stress is the driving force for tin whisker growth, and that a tin deposited that does not exhibit compressive stress will never form tin whiskers. (See, <http://www.mill-max.com/rohs/Whisker%20resistant%20tin%20deposit%20letter%2004.pdf>, wherein this idea is clearly stated.) Therefore, without other, Soeda actually teaches and suggests a tin alloy in compressive internal stress, as opposed to the tensile internal stress.

It should further be noted that dependent Claim 12 requires that the internal stress is attributable to the layer being deposited under tensile stress. Soeda makes is clear that its internal stress is attributable to the oxidation of the tin with the elapse of time. Thus, the internal stress of

Soeda is a function of the oxidation that may occur because of the lapse of time, and not because how it was deposited. The Examiner appears to misconstrue Soeda in such a way as to believe that it is Soeda's deposition, and not the oxidation, that causes the whisker growth. This is clearly not the case.

In contrast to that argued above, the Examiner states that "Soeda discloses that 'the increase in internal stress of the thin coating layer is small...it is inferred that the formation of whiskers is inhibited' (for Example; See page 5). Therefore, tensile stress is present in Soeda because whiskers are inhibited." The Examiner, however, is misreading this portion of the reference. This portion of the reference makes it clear that it is the reduction in the internal stress of the tin coating layer in combination with the reduction in the formation of intermetallic compounds (e.g.,  $\text{Cu}_3\text{Sn}$ ) that creates a synergistic effect that inhibits whisker growth. Accordingly, it is not the use of tensile stress in Soeda that inhibits the whisker growth, but the reduction in stress and reduction in the formation of intermetallic compounds that inhibits the whisker growth.

The Examiner further states that "Soeda does not disclose that the internal stress is attributable to oxidation. Soeda discloses that 'a coating layer containing zinc at less than 10%, the amount of diffusion of zinc is small...the increase in the internal stress of the tin coating is small...it is inferred that the formation of whiskers is inhibited by this synergistic effect.'" In actuality, Soeda discloses many reasons for the increase in internal stress, including oxidation, diffusion of zinc and formation of intermetallic compounds, but fails to disclose that the internal

stress is related to the act of depositing the tin layer under tensile stress. Accordingly, Soeda also fails to anticipate this claimed element.

Therefore, Soeda does not disclose each and every element of the claimed invention and as such, is not an anticipating reference. Because Claims 4-6, and 11-12 are dependent upon Claim 1, Soeda also cannot be an anticipating reference for Claims 4-6 and 11-12. Accordingly, the Applicants respectfully request the Examiner to withdraw the §102 rejection with respect to these Claims.

## **II. Rejection of Claim 2 under 35 U.S.C. §103**

The Examiner has rejected Claim 2 under 35 U.S.C. §103(a) as being unpatentable over Soeda in view of Japanese Patent No. 51-143533 to Tsujita, *et al.* ("Tsu"). Independent Claim 1 currently includes the element that the tensile stress state is internal to the tin or tin alloy film. As established above, Soeda fails to disclose (e.g., teach) this element. Soeda further fails to suggest this element. Soeda fails to suggest this element because the only indication as to whether the tin alloy of Soeda is in a compressive state or tensile state, recites that it is in a compressive state. (See, Soeda at page 6, first full paragraph).

Tsu further fails to teach or suggest this element. The Examiner is offering Tsu for the sole proposition that the tin alloy has an average grain size in excess of about 1 micrometer. Without even addressing whether the Examiner's proposition is accurate, a teaching or suggestion that the tin alloy has an average grain size in excess of about 1 micrometer is entirely different from a teaching or suggestion that the tin or tin alloy has an internal tensile stress state, as currently claimed. Accordingly, Tsu also fails to teach or suggest this claimed element.

Therefore, Soeda alone or in combination with Tsu, fails to teach or suggest the invention recited in independent Claim 1 and its dependent claims, when considered as a whole. Accordingly, the combination fails to establish a prima facie case of obviousness with respect to these claims. Claim 2 is therefore not obvious in view of the combination.

In view of the foregoing remarks, the cited references do not support the Examiner's rejection of Claim 2 under 35 U.S.C. §103(a). The Applicants therefore respectfully request the Examiner withdraw the rejection.

### **III. Rejection of Claim 3 under 35 U.S.C. §103**

The Examiner has rejected Claim 3 under 35 U.S.C. §103(a) as being unpatentable over Soeda. The Applicants established above that Soeda fails to teach or suggest the elements of independent Claim 1. Accordingly, Soeda must fail to teach or suggest the elements of dependent Claim 3. Therefore, Soeda fails to establish a prima facie case of obviousness with respect to this claim.

In view of the foregoing remarks, the cited reference does not support the Examiner's rejection of Claim 3 under 35 U.S.C. §103(a). The Applicants therefore respectfully request the Examiner withdraw the rejection.

#### **IV. Conclusion**

In view of the foregoing amendment and remarks, the Applicants now see all of the Claims currently pending in this application to be in condition for allowance and therefore earnestly solicit a Notice of Allowance for Claims 1-6 and 11-12.

The Applicants request the Examiner to telephone the undersigned attorney of record at (972) 480-8800 if such would further or expedite the prosecution of the present application. The Commissioner is hereby authorized to charge any fees, credits or overpayments to Deposit Account 08-2395.

Respectfully submitted,

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